Task Centered Visualization of Electronic Medical Record Flow Sheet

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Abstract

Usability problem of Electronic Medical Record (EMR) systems is a major hurdle for their acceptance. In this study we used the methodology of Human-Centered Distributed Information Design (HCDID) to compare and evaluate Flow Sheet module of two commercial EMR systems. After which we tried to develop usable interface of a flow sheet using visualization, focusing on task -representation mapping during design and development.

Introduction

Medical Records Institute (MRI) defines Electronic medical record (EMR) as "Electronically maintained information about an individual's lifetime health status and healthcare". Electronic medical record (EMR) systems are expected to offer "access, availability, convenience, speed, reliability, and ease of use, quality, security, flexibility, connectivity, and efficiency." In addition, these future patient records are expected to " provide new functions through links to other database and decision support tools."[1]

One critical problem that prevents acceptance of EMR systems is usability.[2] An EMR system should be easy to learn, easy to use and error-resistant. To improve the usability of EMR systems, Zhang et al developed a theoretical framework called Human-Centered Distributed Information Design (HCDID)[3]. It incorporates the breadth view based on the theory of distributed cognition and the depth view based on a multi-level analysis hierarchy. HCDID provides a systematical conceptual guideline for the design of highly efficient human-centered computing systems by offering a distributed system perspective for human-centered computing composed of artificial and human agents.

The medical record flow sheet is a collection of clinical observations made over time, arranged in a row-column matrix. The objective of this project was to use the Human-Centered Distributed Information Design (HCDID) method to compare and evaluate the usability of Flow Sheet modules of two commercial EMR systems. We will try to develop usable interface of a flow sheet using visualization, focusing on task-representation mapping during design and development.

Methods

User analysis, Task analysis and Representation analysis were performed by questionnaires with participating caregivers. Usability evaluation on commercial EMR Flow sheet and redesigned prototype were tested according to the fourteen heuristics developed by Zhang, Johnson, & Johnson[4]. The prototype Flow Sheet interface was implemented in Microsoft Visual Basic with Microsoft Access 2000 as the backend database. A user satisfactory survey was performed after testing.

Evaluation and Results

User analysis identified caregiver characteristics including age, educational level, profession, computer experience, and so forth. Task analysis determined what functions caregivers need and want in a flow sheet under different scenarios (inpatient and outpatient settings). After identifying the users and their specific tasks, we determined different representations (views) for each group of users according to their tasks. A prototype Flow Sheet interface was designed and developed according to the requirements.

Usability evaluation was performed on Flow Sheet of current EMRs. The problem of current EMRs was reported and addressed during designing the prototype. The results of the heuristic evaluation and user satisfactory survey of the prototype were used to improve and refine the prototype.

Conclusions

This present study used Human-Centered Distributed Information Design (HCDID) method to compare and evaluate the usability of Flow Sheet module of current EMR systems . A prototype was designed and developed to address and solve the problem of current EMRs. HCDID is a useful method which will be used to evaluate and develop usable modules of EMR systems.

References

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